Cortona® VRML Client User's Guide

The following sections contain the description of the Cortona® VRML Client main controls:

- The Cortona VRML Client Window
- Navigating in Cortona VRML Client
- Setting Cortona VRML Client Options
- Interacting with the Scene
- Using Cortona VRML Client in HTML Documents
- 3D Scene Stereo Viewing

The Cortona VRML Client Window

With Cortona VRML Client you can see and explore 3D worlds. Cortona VRML Client will start automatically when you open a file containing VRML world. There are two parts of the Cortona VRML Client window:

1. Toolbars:
    - The *vertical toolbar*, which contains buttons used to specify navigation type in a world.
    - The *horizontal toolbar*, which contains buttons with predefined actions to change your position in a world.
2. The *3D window*, which shows VRML world.

There is also *pop-up menu*, which you access by pressing the right mouse button while the pointer is over toolbars or 3D window.

Some worlds do not allow you navigating in a world, so toolbars may be invisible.

Navigating in Cortona VRML Client

Moving through a 3D space is similar to moving a camera. Think of a video camera that captures images in the real world and converts them into electronic signals for viewing on a screen; it has a position and orientation, and these are independent attributes.Your movements in the world continually position and orient that camera. Use the camera controls on the vertical toolbar to move the camera through the 3D Space.

This concept assumes that there is a real person viewing and interacting with the VRML world. Nevertheles, the VRML author may place any number of viewpoints (or cameras) in the world - interesting places from which the user might wish to view the world. Only one viewpoint may be active at a time. This section

describes the mechanisms that Cortona VRML Client provides for navigating in a three-dimensional space.

Using Viewpoints

A viewpoint describes a position and orientation for viewing the scene. The VRML author will probably want to guide the user to the best vantage points for viewing it. Not all worlds contain viewpoints, but when they do, you can use them.

To activate a viewpoint, do one of the following:

-

Click the VIEW in the horizontal toolbar or choose viewpoints from the pop-up menu, and then select a viewpoint from the list of the predefined viewpoints.
- Click the arrow buttons to move to the next or previous viewpoint. You can also press Page Down or Page Down keyboard button.

Note:
If there are no predefined viewpoints in a world, the Empty message appears.

Moving around: Walk, Fly, and Study

There are three main navigation modes that Cortona VRML Client offers: WALK, FLY, and EXAMINE. You can switch the navigation mode by clicking buttons on the vertical toolbar (click STUDY to enter EXAMINE mode). Each navigation mode may have several options: PLAN, PAN, TURN, and ROLL. The combination of navigation mode and its option determines the possible camera motion and its orientation. Please note that the VRML author has an opportunity to specify which navigation paradigm should be used in the scene by default. Some worlds don't allow the user to use navigation controls, but they may provide on-screen cues to navigation.
You can navigate with the mouse, the keyboard, or both mouse and keyboard. To move around a 3D world using the mouse:

1. Choose a navigation mode.
2. Position the pointer anywhere in the 3D window and press the left mouse button.
3. Move the mouse while holding down its left button. The *direction* in which you drag the mouse determines the camera motion.
4. Release the left mouse button to stop moving.

Note: The *distance* that you drag the mouse determines the *speed* with which the camera moves. If you stop moving the mouse, the camera will continue moving until you release the mouse button. To accelerate the camera's movement or rotation, press SHIFT, CTRL or SHIFT+CTRL.

and

Use WALK+PLAN to move in a horizontal plane.

⇧ Forward - move closer

⇩ Backward - move further

Right - turn to the right

Left - turn to the left

Note: Move the mouse forward or backward while holding down the Space key to turn upward, downward.
Move the mouse left or right while holding down the ALT key to move left or right.

and

Use WALK+PAN to move left or right in a horizontal plane.

⇧ Forward - move closer

⇩ Backward - move further

⇨ Right - move right

⇦ Left - move left

Note: When you move the camera right or left, the world will appear to move in the opposite direction.

and

Use WALK+TURN to change the angle of the camera in a world.

Forward - turn upward

Backward - turn downward

Right - turn to the right

Left - turn to the left

Use FLY+PLAN to move left or right.

Forward - move the camera forward towards its longitudinal axis

Backward - move the camera backward

Right - turn the camera to the right around its vertical axis

Left - turn the camera to the left around its vertical axis

Note: The camera's vertical axis may be inclined in a 3D Space.
Move the mouse while holding down the ALT key to switch FLY+PAN.
Move the mouse while holding down the Space key to switch FLY+TURN.
Move the mouse while holding down the ALT+Space keys to switch FLY+ROLL.

Use FLY+PAN to move up, down, left, or right within a single vertical plane.

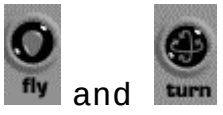
Forward - move up

Backward - move down

 Right - move right

Left - move left

Note: When you move the camera, the world will appear to move in the opposite direction.



Use FLY+TURN to turn the camera.

Forward - turn the camera upward around its horizontal axis

Backward - turn the camera downward around its horizontal axis

Right - turn the camera to the right around its vertical axis

Left - turn the camera to the left around its vertical axis

and

Use FLY+ROLL to incline the camera.

Right - incline to the left

Left - incline to the right

and

Use STUDY+PLAN to examine an object from various angles.

Forward - move the camera forward

Backward - move the camera backward

Right, Left - move the camera around the central point which is defined by the center of bounding box of the geometry in the 3D scene.

and

Use STUDY+TURN to examine an object from various angles.

Forward, Backward, Right, and Left - move the camera around the central point which is defined by the center of bounding box of the geometry in the 3D scene.

Note: Move the mouse while holding down the ALT key to switch STUDY+PAN.

Move the mouse while holding down the Space key to switch STUDY+PLAN.
Move the mouse while holding down the ALT+Space keys to switch STUDY+ROLL.

and

Use STUDY+ROLL to incline the camera around the central point which is defined by the center of bounding box of the geometry in the 3D scene.

Right - incline to the left

Left - incline to the right

Note: The VRML author can choose the rotation center in the EXAMINE navigation mode. By default, when in EXAMINE mode, Cortona VRML Client sets the center of rotation in the center of the bounding box of the scene geometry. But it is possible to change this center by specifying three additional values in the avatarSize field of the NavigationInfo node. According to the VRML specification, the first three values are the avatar dimensions, while additional values may be used for browser-specific purposes. In Cortona VRML Client the fourth, fifth and sixth values specify the center of scene rotation in the world coordinates X,Y and Z.

Use GOTO to move close to object in a world. Select GOTO in the toolbar and then click on an object in the world. You'll move directly to it.

Restore, Fit, and Align

Cortona VRML Client provides three mechanisms that can help to re-orient a camera if you have lost your way in a world. Unlike the navigation tools, these buttons invoke predefined actions that take place as you click on them.

Use RESTORE to automatically return to the loaded world's original active viewpoint.

Use FIT to make the scene view fully visible in the Cortona VRML Client 3D window.

Use ALIGN to position the camera's horizontal and longitudinal axes parallel to the scene horizontal plane.

Using Keyboard for Navigating

You can control the camera using keyboard commands. The functionality for buttons corresponds to the movement of your mouse and depends on the navigation type, its option, and the specified skin. Please note that the following description of keyboard commands is presented for the FLY+PLAN navigation and the Default skin.

- Arrow Up - move closer.
- Arrow Down - move further away.
- Arrow Right - turn to the right.
- Arrow Left - turn to the left.
- Arrow Up on the numeric keypad - move closer.
- Arrow Down on the numeric keypad - move further.
- Arrow Right on the numeric keypad - move to the right. If the STUDY mode - move the camera around the center of rotation.
- Arrow Left on the numeric keypad - move to the left. If the STUDY mode - move the camera around the center of rotation.
- 7 on the numeric keypad - turn the camera downward around its horizontal axis.
- 9 on the numeric keypad - turn the camera upward around its horizontal axis.
- 1 on the numeric keypad - incline to the right. Note: It is not available in WALK mode.
- 3 on the numeric keypad - incline to the left. Note: It is not available in WALK mode.
- Gray Plus - move up in the case of FLY mode.
- Gray Minus - move down in the case of FLY mode.
- 1 on the alphanumeric keyboard - incline to the right. Note: It is not available in WALK mode.
- 2 on the alphanumeric keyboard - incline to the left. Note: It is not available in WALK mode.
- 3 on the alphanumeric keyboard - turn downward. If the STUDY mode - move the camera around the center of rotation.
- 4 on the alphanumeric keyboard - turn upward. If the STUDY mode - move the camera around the center of rotation.
- Page Down - next viewpoint.
- Page Up - previous viewpoint.

- Pause - Enables or disables CylinderSensor, PlaneSensor, SphereSensor, and TouchSensor in Cortona VRML Client.

To accelerate the camera's movement or rotation: Press SHIFT, CTRL or SHIFT+CTRL and one of the above keys simultaneously. The ALT and SPACE keys allow the user to quickly change the navigation option to PAN and TURN accordingly in the FLY navigation mode (to ROLL and PLAN in the STUDY mode). The ALT and SPACE keys simultaneously pressed activate ROLL in the FLY navigation mode or PAN in STUDY.

Setting Cortona VRML Client Options

The following options are supported from the pop-up menu of 3D window:

- **Viewpoints**. Activates a list of the predefined viewpoints.
- **Headlight**. Cortona VRML Client automatically includes a light for the viewer in every world. The headlight always shines directly in front of the camera. You can switch the headlight on and off.
- **Navigation**. You can select a navigation mode.
- **Speed**. Controls the rate at which a camera moves through a world.
- **Full Screen**. This hides most screen elements so that you can view the whole scene. To close Full Screen, press ESC or F11.
- **Hide/Show Toolbars**. You can show or hide toolbars.
- **Show/Hide Console**. Shows or hides the VRML console containing errors or warnings (for VRML developers).
- **Preferences**. Modifies settings for Cortona VRML Client such as screen appearance, a renderer mode, and other options.
- **Help**. Lets you view the online Help system and general information about Cortona VRML Client.

You can configure Cortona VRML Client options according to your preferences. To change settings, choose **Preferences** from the right-button pop-up menu. The ParallelGraphics Cortona Control dialog box is displayed:

General

- **Loading**. The Show progress check box determines whether the current state of the loading process is shown. If the Wait for all resources is selected, the scene will not be shown until all resources are loaded. If it is cleared, the scene's geometry will be shown immediately after the main wrl file loading.

- **Appearance**. You can change a background color of Cortona VRML Client 3D window: Click the Background color box at the General tab, click the desired color from the palette, and then click OK. VRML authors can also control a color that simulates ground and sky.
- **Display frame rate**. Allows you to display the frame rate on the status bar.
- **Console mode**. Shows or hides the VRML console containing errors or warnings. The ConsoleMode attribute is set to Autolaunch by default. This shows the VRML console if errors or warnings occur.
- **CPU load**. Determines the degree of acceleration for Cortona VRML Client renderer. This allows you to specify the processor usage in the range from 0 (minimum frame rate, maximum the processor idle time) to 100 (maximum frame rate).

Scene

Scene location. Shows the currently opend VRML file and lists the files you have recently opened. To quickly reopen one of these files, click it in the Scene location list box and then click Apply. You can also open a document on your computer hard disk or on a network drive that you have a connection to by clicking the Browse button.

Renderer

Allows you to select a rendering mode. To draw the 3D image, Cortona VRML Client provides two hardware renderers: OpenGL and DirectX. If your system has hardware acceleration for either OpenGL or Direct3D (note: you must have DirectX 5 or greater installed), choose the appropriate renderer. Using hardware renderers can introduce limitations. Select a renderer to compare the performance and visual quality of hardware versus software rendering and set your preferences accordingly.

Renderer options

- **Dither colors if needed**. Controls whether Cortona VRML Client dithers while rendering. Dithering improves the quality of rendering, but may lower performance.
- **Motion blur effect**. Apply a motion blur effect. This actually makes an image seem a little blurred in motion.
- **Wireframe rendering mode**. The object appears to be outlined with wires rather than solid.
- **Anti-aliasing**. The technique for smoothing out jaggies in showing curves on computer monitor. There are two different modes: Idle-time and Real-time. If the Idle-time

option is on, it is applied only for static scene. Whereas selecting Real-time initiates smoothing even in the viewer movement but results in decreasing frame rate.

- **Do not render textures**. To turn the textures on or off.
- **Limit textures size**. All textures are optimized for speed.
- **Optimize texture for quality**. All textures are optimized for quality. Note that if you select both Optimize texture for speed and quality, the renderer uses the available resources to optimize speed and quality simultaneously.
- **Use textures mip-mapping**. When the scene contains acutely angled polygons that disappear into the distance, mixes low- and high-resolution versions of the same texture to reduce the jagged effect.
- **Advanced alpha blending**. Alpha blending is the name for the alpha channel control, and it's used to simulate effects such as placing a piece of glass in front of an object so that the object is completely visible behind the glass, unviewable, or something in between. Advanced alpha blending turns a particular rendering method on for better quality of translucent faces. The processor should support MMX additional instructions.
- **Extended Z-buffer**. If the check box is selected, this sets the 32-bit Z-buffer for the software renderer (R98). The default is 16-bit.
- **Phong lighting model**. A particular method for computing the apparent color of a face at a particular point. It improves the quality of lighting, but lower performance. Note that this option is available only for R98 Renderer in the Intel Pentium III optimization mode.
- **Realistic fog**. A method for computing the color for every pixel in the frame buffer to simulate fog. It improves the quality, but lower performance.
- **Strict VRML97 compliance**. When selected, Cortona VRML Client renders VRML scene in accordance with the VRML97 Specification. If it is turned off (the default), simplified lighting equations and rendering techniques, which provide higher performance, are used.
- **Optimization**. Turns the optimization rendering mode on or off, if possible.
- **Renderer version**. This is accessible only for Direct3D renderers. Allows you to select a Revanche DX5 rendering mode in the case you have DirectX 7 or a later version installed.

Navigation

- **Navigation mode**. This allows you to select the navigation mode from a list of available navigation paradigms.

- **Travel speed**. Sets the rate at which the viewer travels through a scene. The following are the typical values for the rates, in metres per second: Slowest=0.0625, Slower=0.25, Normal=1, Faster=4, Fastest=16. If the speed field of the NavigationInfo is specified in the VRML file, the corresponding speed factors are multiplied.
- **Animate viewpoint**. Sets the Viewpoint transition rules that specify how Cortona VRML Client interprets the transition from the old viewpoint to the new one. Auto - defined by the jump field of the Viewpoint node of a new location. Always - a jump with the transition effect. Never - instantaneous transition.
- **Collision detection**. By default, Cortona VRML Client will allow you to pass through objects in your path. To prevent from passing through objects, select Always in the Collision detection box at the Navigation tab. Select Auto to use the collision method specified by VRML author.
- **Headlight on**. Mark the check box to turn the headlight on.
- **Show hidden viewpoint**. This allows you to see all viewpoints of the scene in the VIEW list including those that do not have a description (a Viewpoint's description field is empty).

Skin

Use the skins to change the appearance of the dashboard in the Cortona VRML Client window. This version of Cortona VRML Client includes at least two simple skins: Default and CAD-like.

To apply a skin:

- In the list of skins select the skin you want to apply and then click Apply.

When you apply a skin it is then displayed in the Cortona VRML Client 3D window. Please note that Cortona VRML Client provides the capabilities for creating your own user interface. The description of the types of files you can use to make up a complete skin can be found at (http://www.parallelgraphics.com/developer/products/cortona).

Interacting with the Scene

Some of the objects in the scene may provide special effects that allow the user to interact with the scene in different ways. As you position the pointer over the object, containing a VRML *sensor*, the pointer changes:

- Touch Sensor. Detects a click or the pointer over the object. The sort of activity in the scene is decided by the

VRML author.

- Anchor. Clicking will link to the other object, VRML world or HTML document.
- Cylinder Sensor. Transforms pointer motion into a rotation of the object around its axis.
- Sphere Sensor. Transforms pointer motion into a rotation of the object around its two axes.
- Plane Sensor. Transforms pointer motion into a moving of the object.
- Drop Sensor (VRML extension). Handling a drag-and-drop operation. Retrieves an object's uniform resource locator (URL) of an object (resource) dragged to the 3D window.

Note:
The following node types are pointing-device sensors: Anchor, CylinderSensor, PlaneSensor, SphereSensor, and TouchSensor. You can enable or disable them in Cortona VRML Client excepting the Anchor sensor by pressing the Pause keyboard button.

Using Cortona VRML Client in HTML Documents

To display a VRML world in a Web browser authors should use the EMBED or OBJECT (supported by Internet Explorer) elements with the proper attributes in an HTML document:

An example of using EMBED

```
<EMBED SRC="file.wrl"
WIDTH="300"
HEIGHT="300"
PLUGINSPAGE="http://www.parallelgraphics.com/cortona"
VRML_DASHBOARD="FALSE"
VRML_BACKGROUND_COLOR="#000077"
CONTEXTMENU="FALSE"
MASK="0 0, 150 10, 300 0, 290 150, 300 300, 150 290, 0
300, 10 150">
```

where

- **SRC** specifies the name of the VRML scene to be loaded.
- **PLUGINSPAGE** If the user doesn't have a plug-in installed to handle the defined object data type, then it is possible to guide the user to a different URL (the value of the PLUGINSPAGE attribute) to provide instructions on installing the necessary plug-in module.

- **VRML_DASHBOARD** "TRUE" - turns on horizontal and vertical toolbars; "FALSE" - turns off.
- **VRML_BACKGROUND_COLOR** "#rrggbb" specifies the background color of the 3D window (hexadecimal).
- **CONTEXTMENU** "TRUE" - enables context menu in the 3D window; "FALSE" - disables.
- **MASK** allows to specify non-rectangle clipping region.

See how it works

For more information about the Cortona plug-in specific attributes, see (http://www.parallelgraphics.com/developer/products/cortona/html/embed/).

An example of using OBJECT

```
<OBJECT
CLASSID="CLSID:86A88967-7A20-11d2-8EDA-00600818EDB1"
WIDTH="300"
HEIGHT="300">
<PARAM NAME="Scene" value="file.wrl">
</OBJECT>
```

where

- **CLASSID** identifies the Cortona ActiveX control for the browser. The value must be entered exactly as shown.
- **WIDTH, HEIGHT** standard formatting attributes.
- **Scene** specifies the name of the VRML scene to be loaded.

See how it works

For more information about the Cortona VRML Client properties, see (http://www.parallelgraphics.com/developer/products/cortona/html/object/).

Using Cortona VRML Client Automatic Installation

Internet Explorer can automatically download Cortona VRML Client if it is not already installed. It gives the opportunity to reduce download size and choose Cortona VRML Client as VRML viewer despite the fact that the other VRML browser is installed on the user's computer. This technology provides to developers the CAB file for HTML-based Internet installations of Cortona VRML Client.

An example of Using Cortona VRML Client Automatic Installation

```
<!-- Installs Cortona VRML Client components for MS IE
-->
<OBJECT
CLASSID="CLSID:86A88967-7A20-11d2-8EDA-00600818EDB1"
CODEBASE="http://www.parallelgraphics.com/bin/cortvrml.
cab"
WIDTH="300"
HEIGHT="300">
<PARAM NAME="Scene" value="file.wrl">
</OBJECT>
```

where

- **CODEBASE** identifies the location of the Cortona VRML Client (CAB file cortvrml.cab, size: 1189KB) so that the browser can automatically download it if it is not already installed.
- **Scene** specifies the name of the VRML scene to be loaded.

See "Using Cortona VRML Client in HTML documents (with examples)" for details on using Cortona VRML Client Automatic Installation (http://www.parallelgraphics.com/products/cortona/html/).

3D Scene Stereo Viewing

For full screen stereo you need to install the proper hardware: a graphics card powered onboard stereo glasses adapter, stereo glasses that are compatible with this graphics card, and a monitor that can supply at least the 120Hz required for normal stereo mode. The corresponding drivers and utilities should also be installed in your system. The video card drivers should support the stereo mode producing page-flipped stereo. It allows many 3D applications to work in the stereo mode. The last NVIDIA 3D stereo drivers support the page-flipped stereo. To ensure your video card supports the page-flipping mode, you should consult the video card manufacturer's instructions. You also need to choose a hardware renderer in Cortona VRML client. Cortona supports two hardware renderers - OpenGL and DirectX. To choose one of the renderers, right-click somewhere in the 3D window, click Preferences in the pop-up menu, and choose the renderer at the Renderer tab of the Cortona properties window. Cortona VRML client only supports the stereo mode in the Full Screen mode. Both hardware renderers support the full screen mode. To enter the Cortona Full Screen mode, choose "Full Screen" from the right-button pop-up menu and choose the desired display mode. To close the Full Screen mode, press ESC or F11.

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